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ABSTRACT

Tropical forests cover 20 percent of the Earth's land surface, but they are rapidly disappearing, with some estimating the loss of 7.5 million hectares a year. This bulletin provides a set of key facts relating to this problem. It details: (1) factors involving the rate at which the forests are disappearing; (2) some of the effects of these losses (including problems of subsistance, industrial products, ecological stabilization, and genetic diversity); and (3) some things that can be done to curb the rapid loss of these forests. The document addresses what the United Nations Environment Programme (UNEP) is doing to deal with this issue on a global scale. It provides a future scenario for the protection of tropical rain forests, along with a listing of resources that can provide more detailed accounts of the issues addressed in this publication. (TW)

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UNITED NATIONS
ENVIRONMENT PROGRAMME

UNEP Environment Brief No 3

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the disappearing forests

Tropical forests cover 20 percent of the Earth's land surface. But they are fast disappearing: closed forests at the rate of 7.5 million hectares a year, and open forests at 3.8 million hectares a year. The livelihoods of millions of the rural poor depend on forest resources– as does the genetic diversity on which many of the world's industries are based. Better forest management is urgently required.

Key facts

- tropical forests cover 2970 million hectares of the Earth's surface but have been rapidly depleted over the past century;
- according to one estimate, at least 235 million more hectares of tropical forest will be cleared or degraded by the end of the century;
- at present rates, nine developing countries will have exhausted their broadleaved forests within 25 years, and a further 13 within 50 years;
- the main cause of deforestation is the need to expand agricultural land – though logging often leads indirectly to deforestation by opening up previously inaccessible areas;
- an action programme to tackle the problem on a global scale is estimated to cost US $8,000 million over the next five years;
- high though this may appear, the cost of prevention – as is so often the case – is trivial compared to that of continued inaction;
- the destruction and degradation of forests has widespread implications for human society;
- although 33 developing countries are currently net exporters of forest products, only 10 are expected to be so by the year 2000;
- deforestation also threatens the natural balance of upland watersheds and deprives the world of the genetic diversity on which it ultimately depends;
- local attempts to protect and manage the forest, and establish new plantations, have been successful in many countries – though not yet on a significant global scale;
- rural women – many of whose families depend heavily on forest or tree products – have proved powerful allies in conservation programmes; non-governmental organizations have proved most effective in implementing projects at the grass-roots level.

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How fast are the forests disappearing?

First, the good news: the developed countries have more forests now than they did a century ago. True, much of it consists of single species of conifers rather than the mixed deciduous forest that has been replaced; and it is also true that in many areas of Europe acid rain and air pollution are now threatening large areas of long-established woodlands. But the fact that many areas of Europe, once severely deforested, have been replanted proves that trees can be replaced, even if the original forest cannot.

The bad news comes from the developing countries, home to nearly all the world's tropical forests, a category that includes jungle, rain forest, cloud forest, and swamp and mangrove forest. Together, these closed forests cover some 1200 million hectares, an area about two-thirds the size of South America; they also contain nearly half of the world's species of plants and animals.

Where the forests are

Tropical forests are very unevenly distributed among the developing countries. If both closed and open tropical forests (those without a continuous canopy but with one that covers more than 10 percent of the ground) are included, Brazil has 26.5 percent of the world total, Zaire 9.2 percent and Indonesia 6.1 percent. Peru, Angola, Bolivia and India each has about 3 percent. The rest is distributed among some 70 other tropical countries.

Until the 1980s, no one knew with any accuracy how fast tropical forests were disappearing. One authority suggested 5.6 million hectares a year; another, the US National Academy of Sciences, suggested 20 million hectares a year. Finally, a joint effort by UNEP and the Food and Agriculture Organization made a systematic study of the problem (*see box below*): their conclusions were that closed forest was disappearing at 7.5 million hectares a year and open forest at 3.8 million hectares a year. The UNEP/FAO assessment is to be revised later in the 1980s.

In brief

- *the rate of destruction of tropical forest is equivalent to about 21.5 hectares a minute*
- *an area of closed forest the size of Sierra Leone disappears every year*
- *the area of open forest that is destroyed or degraded annually is nearly equivalent to the size of Bhutan*

Where destruction is worst ...

Tropical forests have already been greatly reduced in area, and the destruction continues. But the percentage rate of destruction is still relatively small. Furthermore, it varies greatly from country to country, though relatively little between the regions.

Globally, closed forests are being destroyed at a rate of about 0.6 percent annually. At this rate, it would take more than a century to halve the existing area of tropical closed forests. This conclusion is broadly true for Africa, Asia and the Americas. In this sense, the rate of destruction is less than had been

The FAO/UNEP tropical forest resources assessment

The most authoritative assessment of the state of tropical forests is a three-year investigation carried out jointly by the Food and Agriculture Organization and the United Nations Environment Programme, as part of the Global Environment Monitoring System. The results were published in 1981.

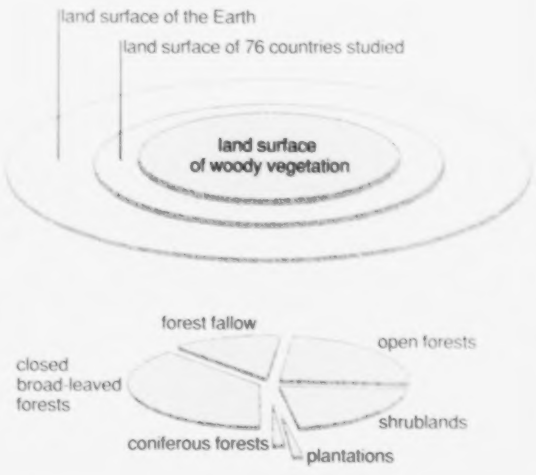
The assessment was carried out on a national basis for 76 countries, and a unique system of classifying the world's forest resources was developed for the assessment (*see diagram*).

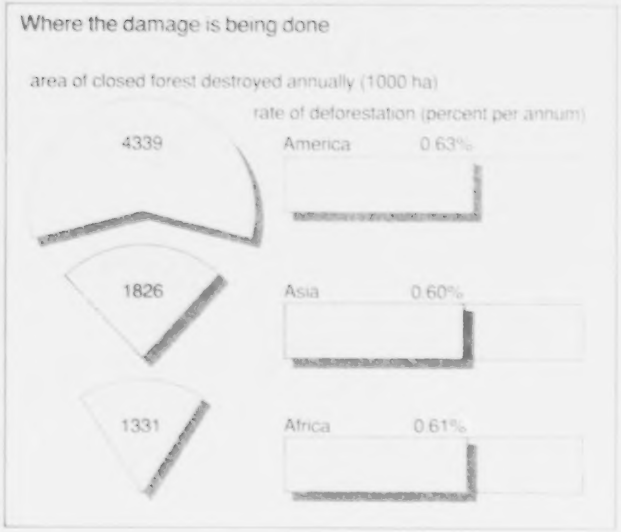
The study revealed that 57 percent of the world total of closed tropical forest is in America. Africa, by contrast, contains 66 percent of the world's open forests and 71 percent of its shrublands. Just three countries—Brazil, Indonesia and Zaire—contain 48 percent of the world's tropical closed forest.

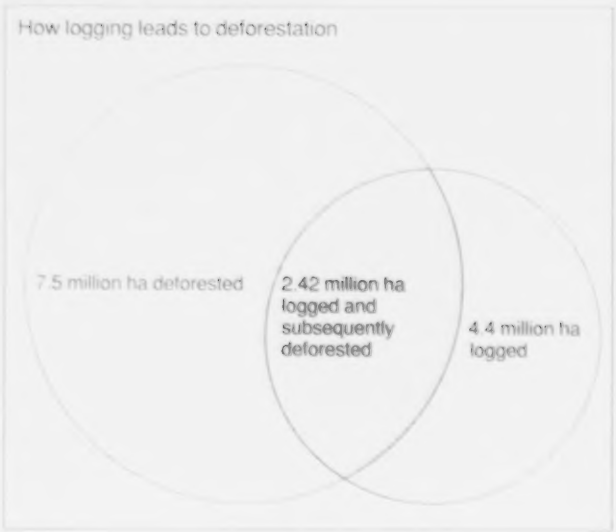
The assessment showed that, though deforestation rates were high, they were not as high as had previously been feared. Only tropical coniferous forests are in immediate global danger. This conclusion, the assessment asserted, provides "an unexpected breathing space during which sound conservation and management strategies can be designed and implemented".

The asseassment also found that clearing for agriculture, particularly shifting agriculture, was the most common cause of deforestation; extraction for fuelwood and charcoal, on the other hand, removes eight times more wood a year than industrial logging.

The state of tropical forests and shrubland






How logging leads to deforestation
7.5 million ha deforested
2.42 million ha logged and subsequently deforested
4.4 million ha logged

feared. Satellite photos in the mid-1970s showed that only 2 percent of Brazil's forest area had been cleared by then, although neighbouring Amazonian countries, with far less forest, were losing it much more quickly. The story is much the same in Africa. In some areas, such as Zaire, deforestation rates are as low as 0.2 percent a year but in the Côte d'Ivoire they reach 7 percent.

Closed forests are expected to disappear altogether within 25 years in 4 countries in the Americas, 3 in Africa and 2 in Asia. Globally, a further 13 countries will lose all their closed forests within 50 years unless effective steps are taken to conserve them.

... and why

Many myths surround the causes of tropical deforestation. The need for fuelwood, for example, leads mainly to the degradation of open forests and plays little part in the destruction of closed forests. Even so, the amount of timber extracted for fuelwood and charcoal is large – roughly eight times as much as is extracted from logging.

Logging itself is not that destructive if carried out efficiently; however, it rarely is. Even if only one tree in 20 is taken, cutting that one tree often damages others. Furthermore, logging often requires new roads to be made in previously inaccessible areas. This often leads to further, more serious degradation. New roads open up the forest to new settlers. Analysis of the data shows that as much as 55 percent of the forest that is logged over eventually becomes deforested.

The major cause of deforestation is the need to expand agricultural land. But blame should not be laid at the door of shifting agriculture itself. Small strips of forest can be cleared, burnt, planted and left to return to natural forest again, provided the fallow period is long enough. In many places, it no longer is.

The reasons for this are complicated. Often, as productive, cultivable land becomes scarce, small-scale farmers are pushed into more marginal areas, and shifting agriculturalists onto fragile upland forest areas unable to support their practices. Fallow periods are then shortened as yields fall and populations increase. It is estimated that shifting agriculture now accounts for 70 percent of deforestation in Africa, 50 percent in Asia and 35 percent in the Americas.

New plantations can take the pressure off natural forest. In Brazil, for example, 11 million of the 38 million cubic metres of wood used annually for charcoal production and fuelwood consumption come from *Eucalyptus* plantations. But in most countries new plantations are not being established nearly fast enough.

> ***"Forest formations have been considered as an endless reserve of land, fruits, animals and wood. Recent history shows us that these resources, theoretically renewable, can also vanish if care is not taken to avoid using them beyond critical thresholds ... there is a real ecological threat to the whole of Africa."***
>
> **FAO/UNEP Tropical Forest Resources Assessment, 1981**

Why does it matter ... ?

Protecting the world's tropical forests is not a matter of conservation for its own sake. Trees are one of the world's most vital resources, all the more valuable because they are renewable. In developing countries, they fulfil four vital functions:

- they provide rural populations with many of their subsistence needs;
- they are critically important to soil and water conservation;
- they are an important source of industrial products, and hence foreign exchange; and
- they harbour vast but little known genetic resources.

Subsistence needs

Rural families depend on forests and trees for a long list of essential products: fuelwood, fodder, fruit, nuts, dyes, medicines, building materials, ropes, nets, fungi and honey are some of them. Fuelwood and fodder alone are in many societies two of the most essential ingredients for survival; without them, rural life would degenerate quickly into a mere struggle for existence.

Perhaps even more important, many rural families depend on tree products for income. Collecting, processing and selling forest products are often the only ways in which rural women can obtain cash income. In the past, these activities have been called 'minor forest industries'. But in no sense are they minor. In India, for example, they provide 25 percent of the value of total forest production, 63 percent of forest-based exports and 1.6 million of the 2.3 million jobs in the forestry sector. No less than 2.5 million people are involved, on a part-time basis, in using the leaves of the tendu tree to make 'beedi' cigarettes. In Egypt's Fayoum province, 48 percent of women work in 'minor' forest industries.

When forests are depleted, rural families must survive without either the products on which they depend or the incomes which they need.

Stabilizing the ecology

Throughout the world, upland watersheds used to be heavily forested. In many areas, the trees have now gone, with disastrous consequences. Heavy rains wash upland soil, together with any crops planted on them, down into the valleys below where riverbeds fill with silt, and flood. Man-made reservoirs and irrigation systems are ruined simply because deforestation has such a dramatic effect on a region's water balance.

In arid areas, trees are equally important, providing fertility to the soil and protecting it from the savage effects of the wind. Without tree roots to hold it together, arid soils turn all too easily into the dust bowls for which the United States became famous during the 1930s. And if fuelwood is in short supply, rural families must use crop wastes for their cooking– wastes that would normally be returned to the soil, providing both humus and fertility. Without vegetation, what rain does fall in these regions is quickly lost as run-off; less percolates the soil, water levels drop and wells dry up.

The benefits of forests

Industrial products

Forests provide pulp for paper, sawnwood, plywood, gums, oils, resins, pharmaceutical plants and many other badly needed materials. In many countries, these are important exports. Poor or exploitive forest management inevitably reduces options, leading first to dwindling exports and then the need to pay for more and more imports. Although 33 developing countries are currently net exporters of forest products, only 10 are expected to be so by the year 2000; the value of developing countries exports is likely to drop from US$ 7 million to only US$ 2 million.

The genetic storehouse

Half the world's species are to be found in tropical forests. This genetic storehouse has already provided many of the strains from which modern crops and medicines are derived; in India alone, more than 2500 plant species have been officially recognized for their medicinal uses. Even the birth control pill has its origins in the Mexican yam.

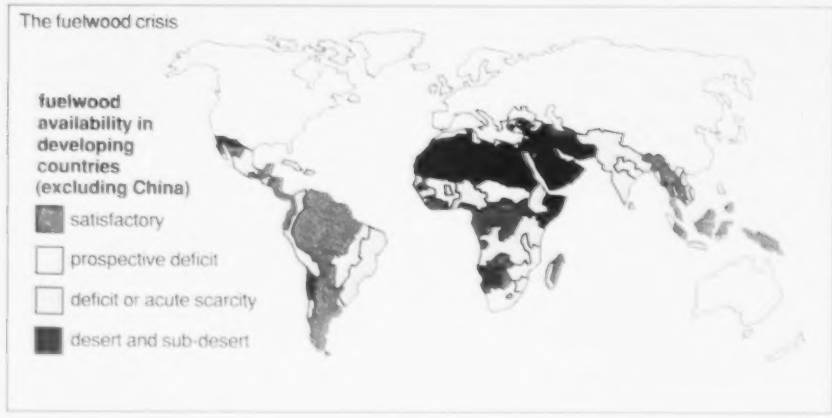
In 1980, the US *Global 2000* report estimated that as many as one million species found in tropical forests could become extinct by the end of the century. While this figure may be exaggerated, the point itself is well made: tropical forests contain a wealth of animal and plant material, much of it still unknown to man. Steps must be taken to ensure that this material is not heedlessly destroyed.

... because lives are threatened

About 2000 million people cook with fuelwood. About 96 million of them are already unable to provide even their minimum needs from wood; another 1052 million can meet their needs only by depleting wood reserves.

These are the stark statistics of the fuelwood crisis. Unhappily, this crisis is only the well publicized part of a far more serious crisis, one that for the most part defies statistical analysis. In the past, the ways in which rural people depend on trees and forests for their subsistence needs has been greatly undervalued. But recent field work has established that what could be called 'subsistence forestry' is of enormous importance. Tree foods, for example, enable many farming families to survive during the harvest when there is never enough time to cook; they also provide security against times of drought and famine, because trees bear their harvest at times of the year and under conditions that other crops cannot match. In some countries, wildlife taken from the forest provides the bulk of the animal protein that is consumed.

Fodder, too, is a vital part of most family economies, where the women look after domestic stock round the homestead. The stock are fed largely from fodder collected from homestead trees or gathered nearby. These trees thus provide, indirectly, milk, eggs and meat. Without them, many rural families could not survive.



... ecologies disrupted

More than 160 million hectares of land on upland watersheds in Africa, Asia and Latin America have already been seriously degraded. A far greater area is subject to some level of deforestation, potentially threatening fertile lowlands throughout the developing world. Some of the most serious problems are occurring in the foothills of the Himalayas and the Andes, and in East Africa, the Philippines, Jamaica and Panama.

A start has been made in repairing some of the damage, though so far only on a scale that is globally insignificant. Nevertheless, work in such countries as Nepal, China, Honduras and Ethiopia proves that it is possible to increase tree cover on degraded upland areas, and so improve conditions in the valleys below.

In Ethiopia, for example, soil conservation projects have been launched on 35 watersheds in the Central Highland Plateau, which supports 70 percent of the country's population. Food for Work Programmes have involved more than a million people in constructing bunds and terraces, building new roads, reforesting denuded land, and improving water conservation with new ponds, dams and weirs.

In Honduras, projects to introduce settled farming techniques on terraced land in place of shifting agriculture were introduced after Hurricane Fifi wreaked extraordinary damage in 1974. Initially, there was strong resistance to change. Success came only after local women took the lead, constructing their own terraces, and raising and marketing a series of highly successful vegetable crops on them.

In Nepal, the government, the World Bank, UNDP and FAO have joined forces to mount one of the most successful watershed restoration programmes, comprising mainly reforestation, better management of existing forests and the introduction of 15,000 wood stoves. The five-year, US$ 25 million project is expected to provide one-third of the fuelwood required by 570,000 people, and sufficient leaf fodder for 132,000 cattle. Because less dung and crop waste will be burnt as fuel, grain production in Nepal's hill region is expected to increase by one-third.

The fate of the Himalayas

As a result of the deforestation of upland watersheds in Bangladesh, India and Pakistan:

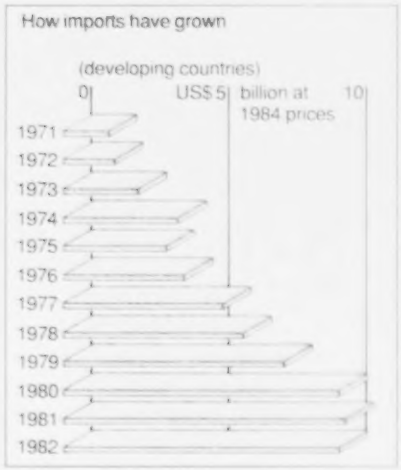
- *sedimentation causes flood damage, and the destruction of reservoirs and irrigation systems, estimated to cost US$ 1,000 million a year;*
- *India spends US$ 250 million a year in flood prevention and compensation; and*
- *further investment in hydropower and reservoirs has become uneconomic because of the threat of sedimentation.*

... industrial uses curtailed

Forests are one of the most important natural resources that any country can possess. Furthermore, they are, to some extent, renewable. Of course, if a tropical forest is destroyed, it may take centuries to regenerate, if it ever does. But if forest products are extracted with care, the basic fabric can be left unharmed to supply more products in the future. Unhappily, in many developing countries, the forest fabric itself is being destroyed.

As a result, these countries are losing a valuable source of both exports and of industrial materials. During the 1970s, for example, Nigeria changed from being a net exporter to a net importer of forest products, even though the country was once blessed with abundant natural forest and has climates and soils that would support fast-growing industrial plantations.

In 1983, the developing countries had to import some US$ 10,000 million worth of forest products. In terms of processed wood products, the developing countries are already net importers; in 1982 their exports of sawn wood, veneer and plywood earned them US$ 3,100 million while their imports of pulp, paper and board cost more than US$ 5,300 million. The prospects for the next few years appear increasingly bleak.



The value of forest exports from countries as diverse as Thailand, the Philippines, Cote d'Ivoire, Cameroon and Malaysia seems likely to fall sharply.

While neglect of forest management is hard to quantify, other critical parameters are not. In developing countries, 4.4 million hectares are logged and 7.5 million are deforested every year; only 1.1 million hectares are planted. And if developing countries exported processed forest products, rather than raw timber, they could increase their export earnings five times.

... and genetic resources destroyed

Most of the species that live in tropical forests have yet to be described or catalogued by scientists– although many of them are well known to local peoples. In African forests alone, more than 200 new plant species are recorded annually.

Preserving the gene pools found in tropical forests is vitally important; with only eight crops supplying 85 percent of the world's food, new types of crop could be essential to human survival. The winged bean, for example, was unknown outside south-east Asia in 1970. Yet it is now grown in more than 50 countries. How many more such crops are waiting to be found in tropical forests? Forests have already provided, among many other things, quinine, rubber, curare and cocaine. What else might they have to offer?

The diversity of a tropical rain forest can be astounding. In an area of just 40 hectares have been found 1500 species of flowering plants, 750 tree species, 400 birds, 150 kinds of butterfly, 100 different reptiles and 60 species of amphibians– not to mention insect species too numerous to count.

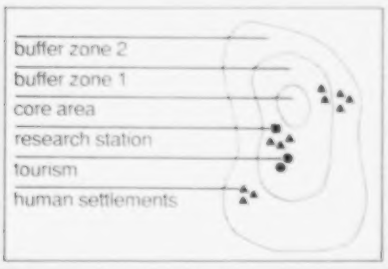
How can these species best be protected? One solution is to establish parks and wildlife reserves. According to the International Union for the Conservation of Nature and Natural Resources, in 1985 there were 406 million hectares of nationally protected land, much of it tropical forest. Strict controls surround the removal of both animals and plants in such areas.

A second solution is to protect the species themselves, through agreements such as CITES, the Convention on International Trade in Endangered Species of Wild Fauna and Flora, which UNEP helped bring into force in 1975.

A third solution, which emerged from the World Conservation Strategy developed by IUCN, the World Wildlife Fund and UNEP, is to encourage nations to formulate their own national conservation strategies. More than 40 nations have prepared, or are preparing, such strategies, which are oriented towards attaining sustainable development.

Establishing biosphere reserves

Unesco began its biosphere protection programme in 1970. Each reserve is designed to protect a representative natural area, and different forms of land use are permitted within it; while the core is completely protected, activities such as farming and logging may be permitted further out. There are now 252 such reserves, covering 128 million hectares.



What can be done

Tropical forests are over-exploited but under-used. On this paradox depends their salvation.

Attempts to persuade the world's nations to act together to conserve the tropical forest have failed in the past, often because the issue was addressed as one of preservation alone. It is not. What is at issue is the wise management of tropical forests on a sustainable basis – one that will permit fuelwood and industrial timber to be extracted to the maximum benefit of the countries concerned, both now and in the future.

In countries all over the world, successful attempts have been made to establish woodlots, introduce wood stoves, reforest upland watersheds, improve logging techniques, protect undisturbed areas of forest and establish major industrial plantations on wasteland.

But there are two major problems: one is that the scale of the operation has so far been too small; and the other is that for every successful project, many more have failed. Why?

One reason is that such projects have often to work against official government policies that favour agricultural development and rapid forest exploitation. Another is that, because many forestry schemes require extensive investment, projects have been planned on an enormous and, in the event, unworkable scale. Bogged down by bureaucracy and top-heavy management structures, projects like this have rarely fulfilled their promise.

On the other hand, small-scale projects in which local people – particularly women – implement the work and plan it with qualified foresters have been more successful. Local non-governmental organizations (NGOs) have proved particularly effective in implementing projects of this kind. Worldwide, about 5000 NGOs are now involved in forestry; progress may depend to a large degree on the support that can be found for these organizations in the future.

Success in brief

• in the Republic of Korea, fuelwood's share of energy consumption was reduced from 55 percent in 1966 to 19 percent in 1979–mainly through more efficient heating techniques

• on the loess plateau in China, one county has planted 15 million trees in five years, halving sedimentation rates

• in 20 years, Zambia has established 45,000 hectares of plantations, enough to supply all its needs for industrial timber until the end of the century

• over the past 14 years, officially protected areas of rainforest have more than trebled; both Brazil and Indonesia now protect as much as the whole world did in 1972

UNEP and tropical forests

The United Nations Environment Programme has a vital role to play in helping preserve the world's tropical forests. While many UN agencies have commercial interests in forestry, UNEP stresses the unique nature of the forest, one that cannot be recreated by industrial plantations.

Thus, for example, UNEP was able to introduce environmental issues into the International Tropical Timber Agreement (which is concerned with trade in tropical timber) before it came into action in 1985.

UNEP played a major role in preparing the World Conservation Strategy, and is now helping nations formulate their own national strategies. With Unesco, it is helping to establish and support protected areas; with FAO, it is helping protect forest genetic resources; and with other organizations it is encouraging reforestation as a protection against desertification. Other programmes stress the importance of proper management of mangrove forests—which are often key breeding areas for fish populations—and the need for training and demonstration in tropical forest management.

UNEP has a special responsibility for charting the way into unknown waters. A key issue—one that has yet to emerge from the realm of ideas into practical action—is how developing countries could be compensated financially for their role in protecting the world's tropical forests. Their forests contain valuable timber which is an important potential source of income; and the land beneath them may harbour even more valuable mineral reserves. Developing countries need incentives *not* to develop these resources, and over the coming years means will have to be found of providing these incentives.

What you can do

- *support local organizations concerned with protecting forests ;*
- *join in tree-planting ceremonies wherever they occur;*
- *think twice before buying articles made from rare hardwoods such as teak and mahogany;*
- *don't buy tropical wildlife, such as parrots and orchids, unless they have been legally approved;*
- *lobby governments and local authorities to protect the forest.*

The future of forests

Alarming though the current rate of destruction is, the future of tropical forests– and the species they support– looks less bleak now than it did a few years ago.

In 1980, UNEP, FAO and Unesco began to prepare for a global plan of action for the wise management of tropical forests. Although they emphasized that such a plan would not infringe on nations' sovereign rights to use their forests as they saw fit, they failed to convince the countries that mattered: 21 nations sent representatives to a meeting in 1982 but these did not include those that really mattered, such as Brazil, Burma, Colombia and Zaire. The plan seems to have been ahead of its time, and was subsequently abandoned.

Now a new plan, to which FAO, the United Nations Development Programme, the World Bank, the World Resources Institute and UNEP have all contributed, looks like having greater potential for success. It calls for US$ 8000 million to be spent on tropical forests over the next five years, half to be mobilized by development agencies and international lending institutions, the other half to come from national governments and the private sector. Most of the countries that should be involved, which spurned global action a few years ago, have agreed to participate.

UNEP, as the UN body that persisted for more than a decade in bringing to the attention of world leaders the urgent issue of the conservation and wise management of tropical forests, has therefore made its mark on the problem. There is, however, still a long way to go.

A call for action

During 1985, the International Year of the Forest, FAO's Committee on Forest Development in the Tropics prepared a Tropical Forests Action Programme, with five priority areas :

- **fuelwood;**
- **forestry's role in land use;**
- **forest industrial development;**
- **conservation of tropical forests;**
- **institution strengthening.**

Since then, an international task force has proposed a five-year action programme to lay the foundations for longer-term investment. Investment profiles were prepared for 56 of the most seriously affected countries.

Investments needed, 1987-91 (critical countries only)

fuelwood and agroforestry	$1,899 million
land use on upland watersheds	$1,231 million
management for industrial uses	$1,640 million
conservation	$ 548 million
TOTAL	$5,318 million

To learn more ...

More detailed accounts of the issues discussed in this publication can be found in:

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